

科目：分子生物學

系所組：生命科學系

Part A (50%)

1. Please define the following terms: **20%**

(1-1) DNA melting temperature; (1-2) inducible gene expression;

(1-3) RNA interference; (1-4) epigenetic inheritance

2. What are the functions of transcriptional repressor and activator? Please use *lac* operon of *E. coli* to explain your answers, and also indicate how the activity of repressor or activator is regulated. **15%**

3. Please describe the purposes and procedures of the following methods. **15%**

(3-1) Electrophoresis mobility shift assay; (3-2) yeast two hybrid assay;

(3-3) Chromatin immunoprecipitation method

Part B (50%)

1. DNA complex with histone proteins and organized into nucleosomes in eukaryotes.

Lysine and arginine are reported to be two most abundant amino acids that composed of histone protein. (1) What is this finding imply in terms of nucleosome structure? (2)

How do they affect gene expression? **20%**

2. Eukaryote and prokaryote are different in their translation initiation steps. Please describe and compare them in details. **10%**

3. Why does DNA use T rather than U in their bases? What will happen if U accidentally incorporated into DNA strand during replication? **15%**

4. How long does it take to synthesize a protein with molecular weight 45,000 at 37°C? Assuming that about 17 amino acids are polymerized per second. **5%**

※ 注意：1.考生須在「彌封答案卷」上作答。

2.本試題紙空白部份可當稿紙使用。

3.考生於作答時可否使用計算機、法典、字典或其他資料或工具，以簡章之規定為準。